

ME571/Geol571 Geology and Economics of Strategic and Critical Minerals

Safety

**Sources: Colorado Mine Safety
and Training Program.
Molycorp Inc., MSHA, OSHA**

**Should you be committed to
Safety?**

100 % of the time?

**On an average day in
America...**

5,937 Americans die!

24,384 Americans suffer disabling injuries from accidents

4,932 Americans are injured in work related accidents

OF THESE...

82 are injured in mining accidents

438 are injured in agricultural accidents

521 are injured in construction accidents

822 are injured in manufacturing accidents

On an average day...

1 American is injured by lightening

35 are injured by fireworks

68 are injured playing golf

104 are injured while shaving

153 are injured using lawn mowers

307 are injured in the bathtub or shower

56,061 Americans drive a car after drinking alcohol

On an average day...

133 Americans will die in an automobile accident of which **71** will be related to alcohol consumption

30 will die in falls

13 will die from fires and burns

11 will die from poisoning

10 will die from suffocation from ingested objects

5 will die from firearms accidents

2 will die from asphyxiating gases or vapors

On an average day...

**30 Americans will die from
work related accidents**

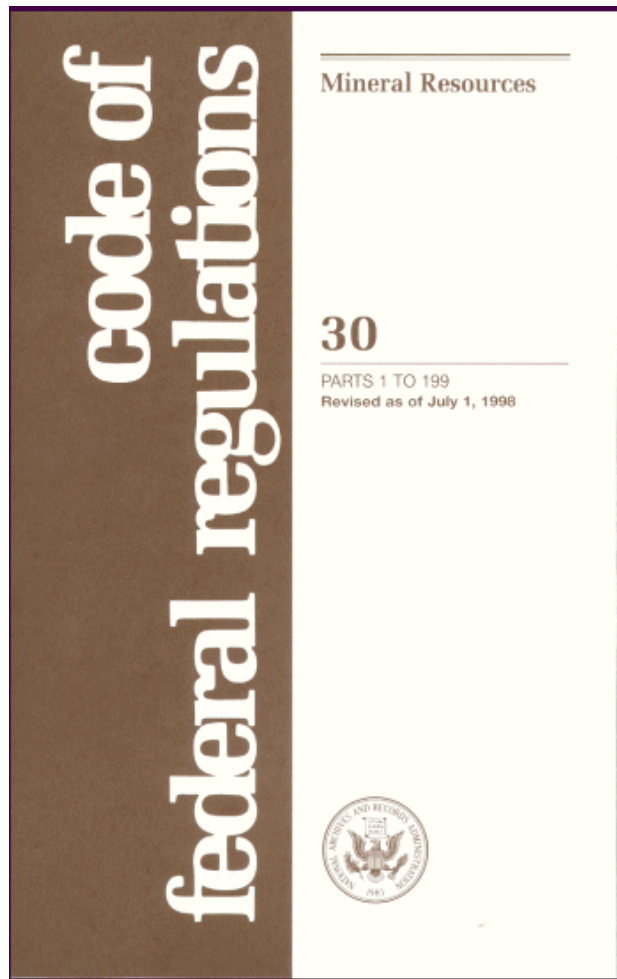
The question is:

**Should you be committed to
Safety 100% of the time?**

"IT'S BETTER TO BE CAREFUL
A HUNDRED TIMES
THAN TO GET KILLED ONCE."

MARK TWAIN

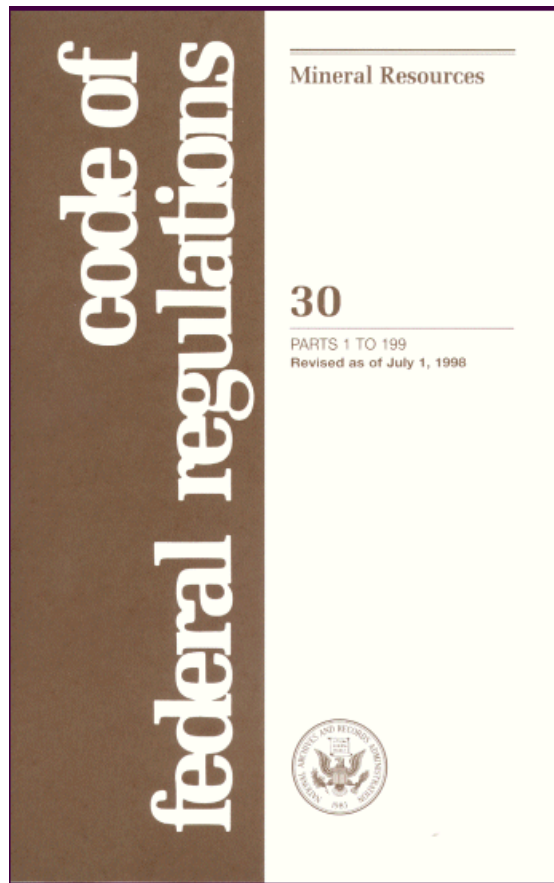
Mandatory Health and Safety Standards



- **MSHA**
- **OSHA**
- **NIOSH**
- **State agencies**



Mandatory Health and Safety Standards



**Can anyone answer
the question:**

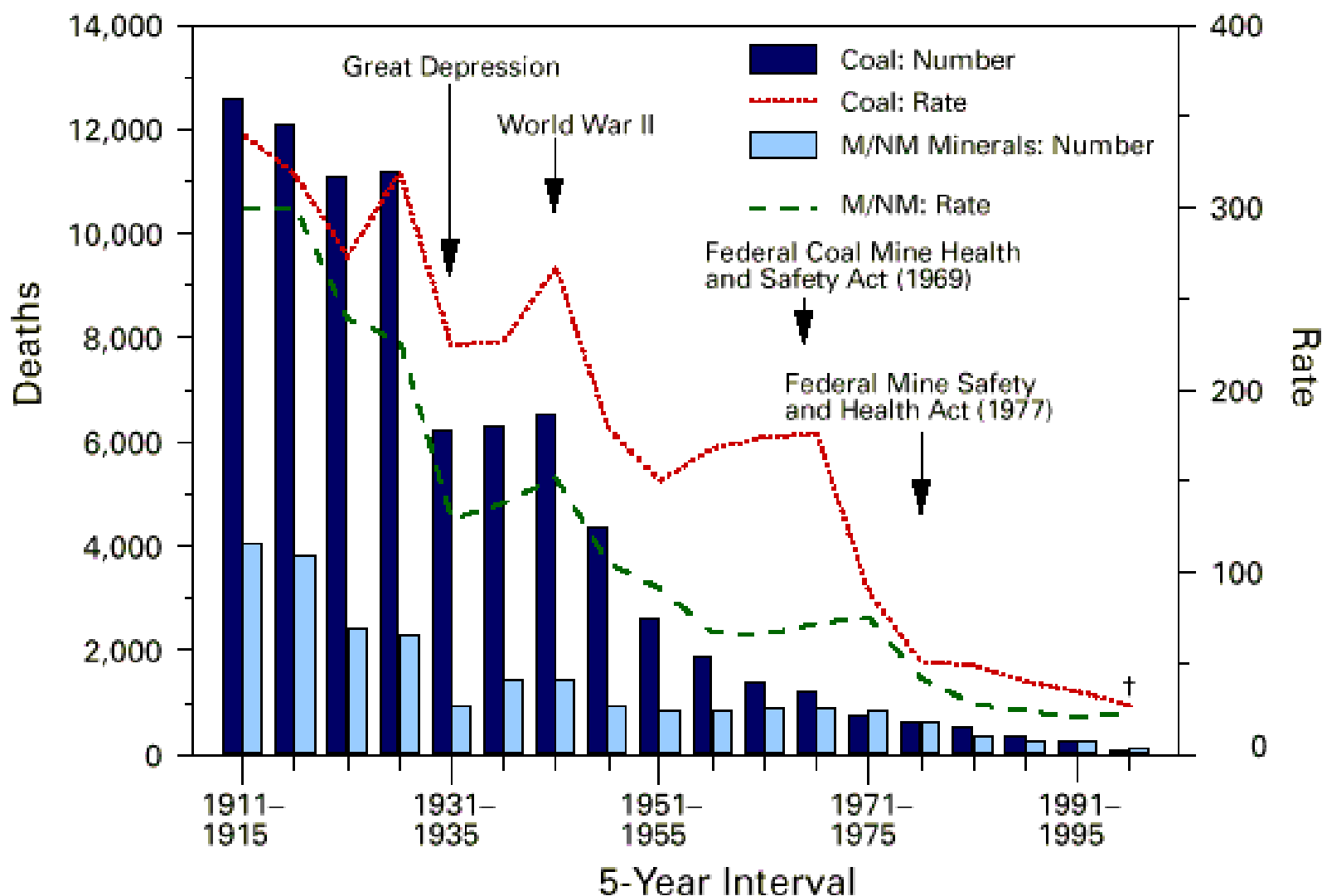
**Why do we have
mining regulations?**

A Brief History Lesson

Some miners believe that all regulations are written in **Blood.**

Underground mining disasters involving multiple fatalities have been the fuel, igniting legislation, that governs how we mine today.

FIGURE 4. Number of deaths and fatality rates* in mining coal and metal/nonmetallic (M/NM) minerals, by 5-year interval — United States, 1911–1997



*Per 100,000 workers.

†Data are for 1996 and 1997.



NIOSH Publication No. 2006-152:

NIOSH Fatal Occupational Injury Cost Fact Sheet: Mining

Number, rate, and costs of fatal occupational injuries in the U.S. mining industry by selected characteristics, 1992–2002

Characteristic	Number of fatalities	Fatality rate (per 100,000 workers)	Costs (2003 dollars)		
			Total (millions)	Mean (thousands)	Median (thousands)
All incidents	1,721	26.0	\$1,788	\$1,039	\$1,064
Sex:					
Male	1,700	29.9	1,768	1,040	1,066
Female	21	2.2	20	942	962
Race of decedent:					
White	1,594	25.7	1,657	1,039	1,065
Black	62	22.1	66	1,070	1,063
Other*	65	45.8	65	999	1,003
Age of decedent:					
16–19	33	37.8	30	905	959
20–24	156	40.3	165	1,055	1,075
25–34	422	29.7	500	1,185	1,192
35–44	509	20.5	623	1,223	1,250
45–54	386	24.6	379	983	978
55–64	155	27.6	86	556	563
65+	60	54.6	5	89	70

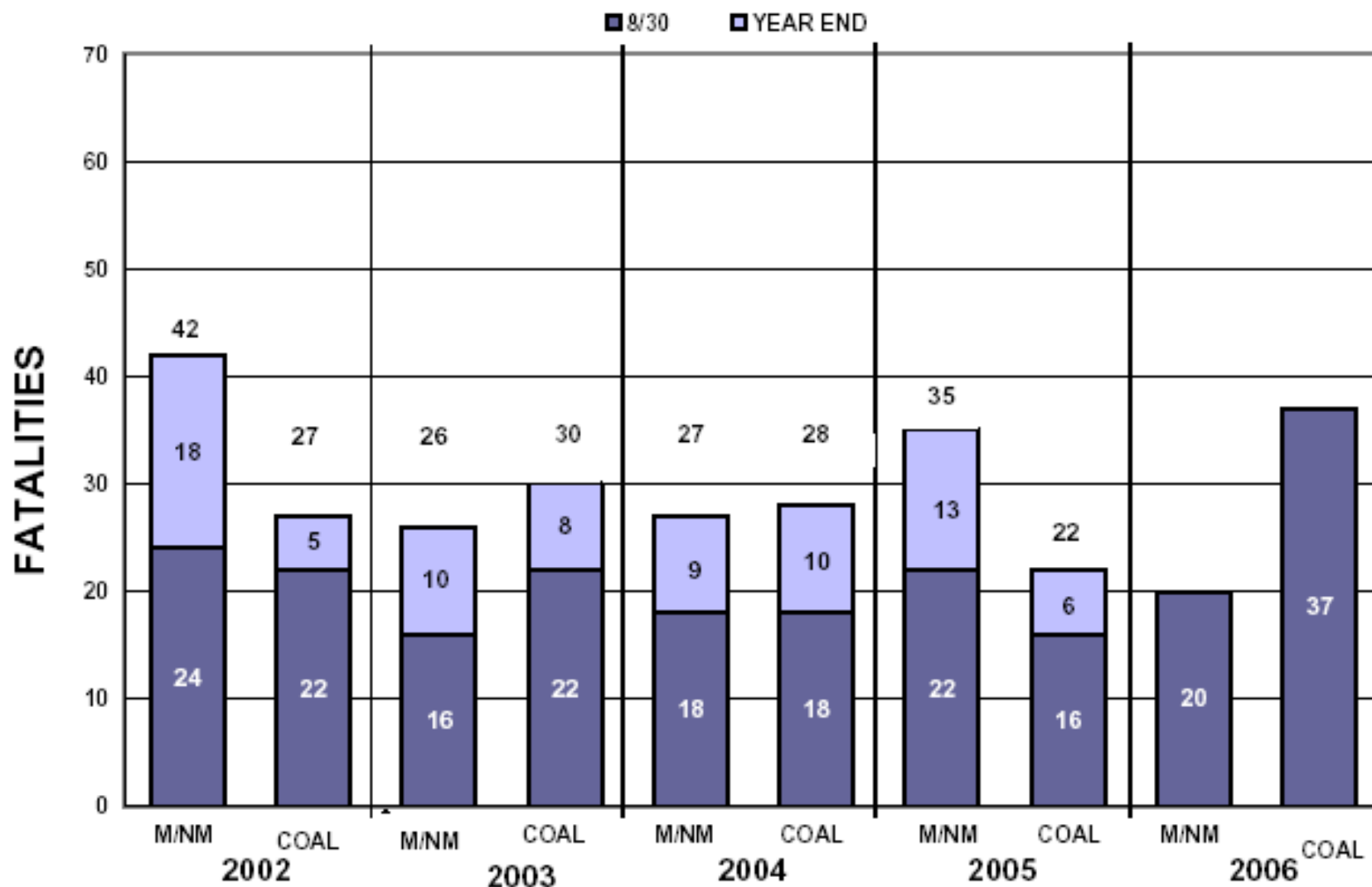
Mine fatalities in 2006

- 72 as of 12/31/06
- 47 in coal mines (12/31/06)
- 25 in metal/nonmetal mines (12/31/06)

Mine fatalities in 2007

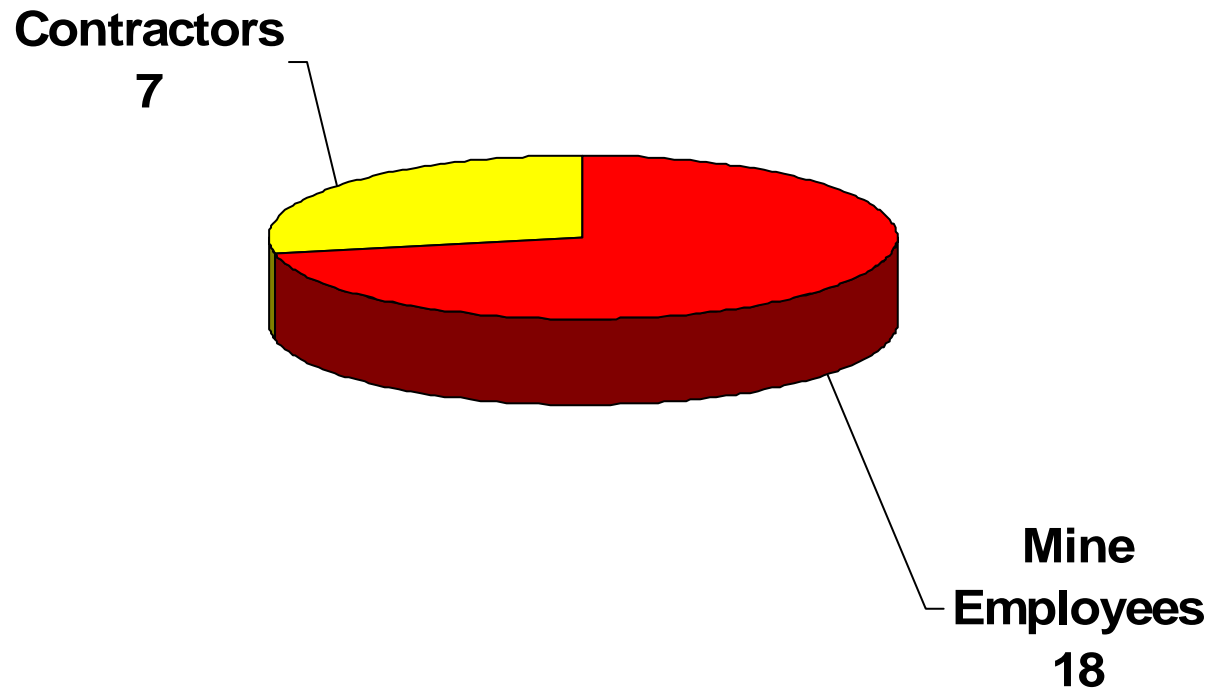
- 5 as of 1/30/07
- 3 in coal mines (1/30/07)
- 2 in metal/nonmetal mines (1/30/07)

COMPARISON OF YEAR-TO-DATE AND TOTAL FATALITIES FOR M/NM & COAL

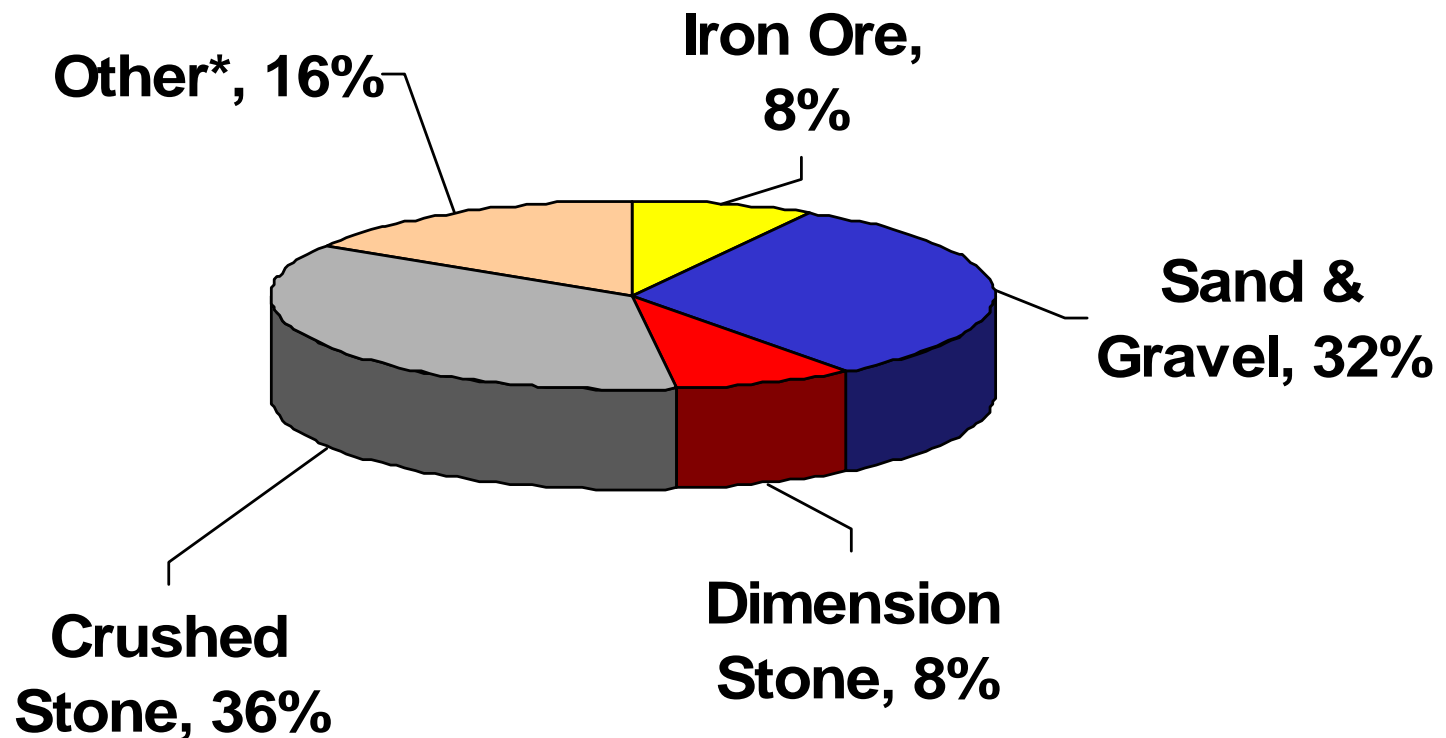


Metal and Nonmetal
Fatal Accident Review
CY 2005

MNM Fatalis

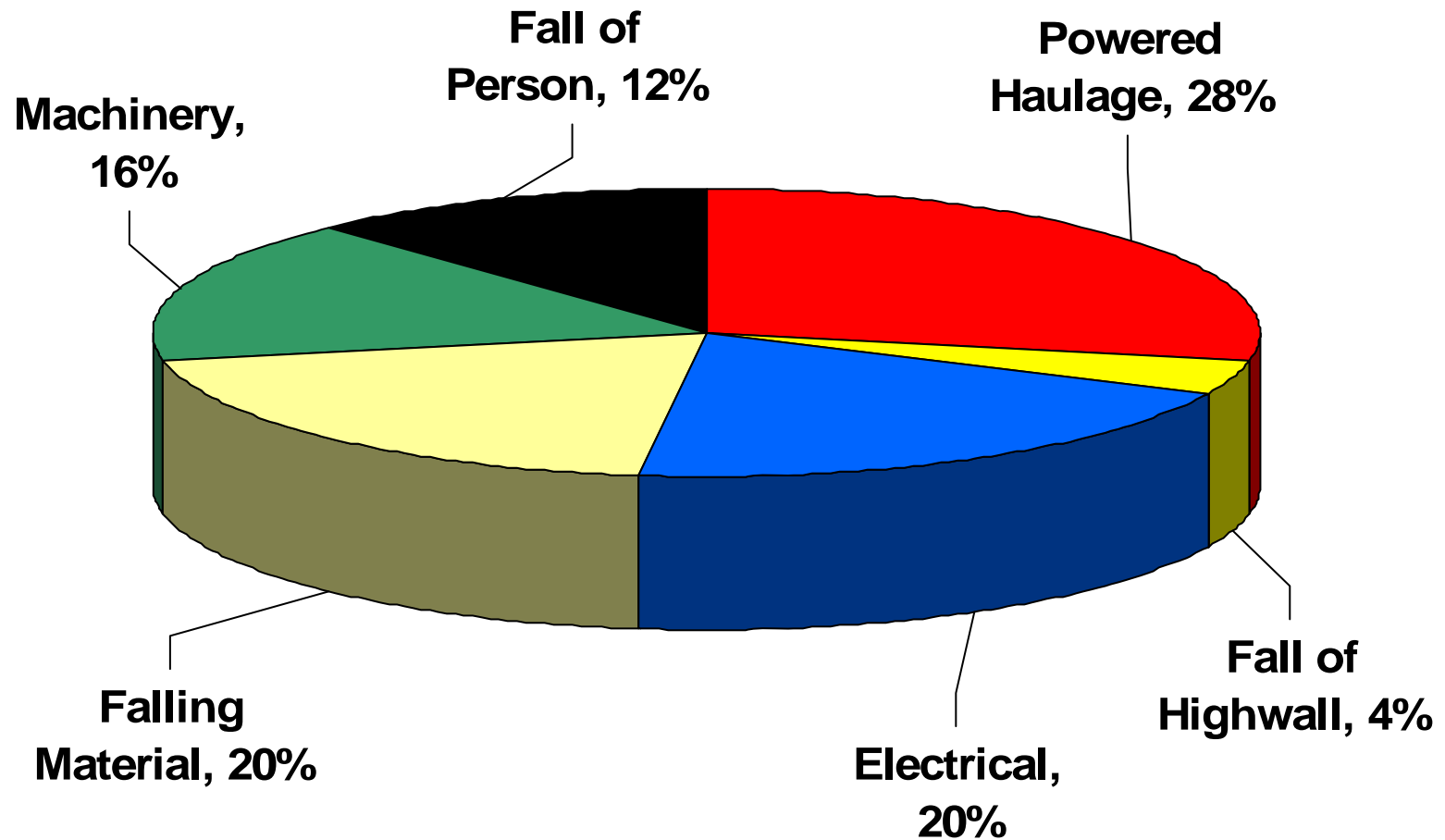


MNM Fatalities by Commodity

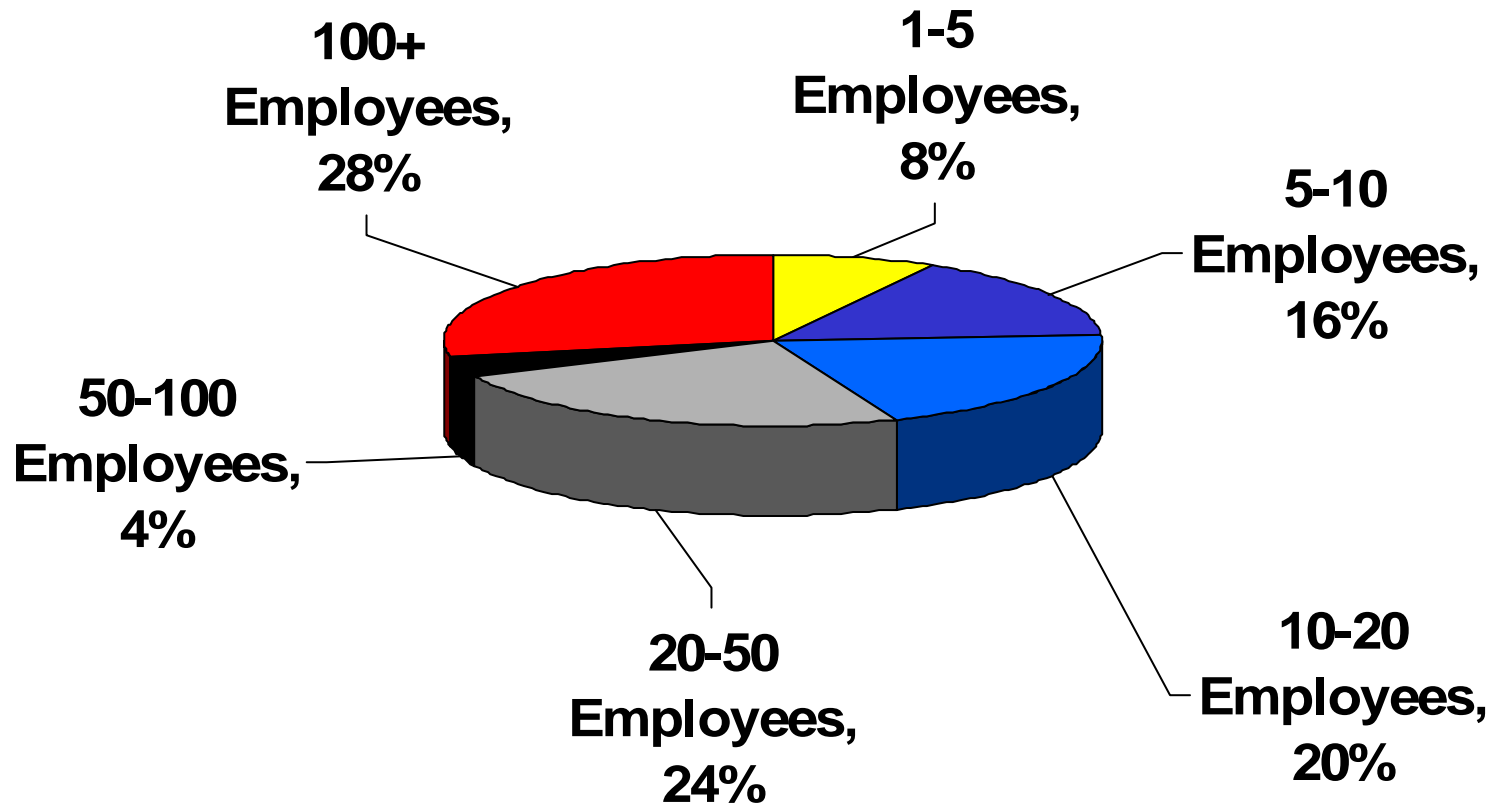


* Trona, Lime, Platinum, Pumice, Phosphate, Iron Ore, Sandstone, Potash, Copper

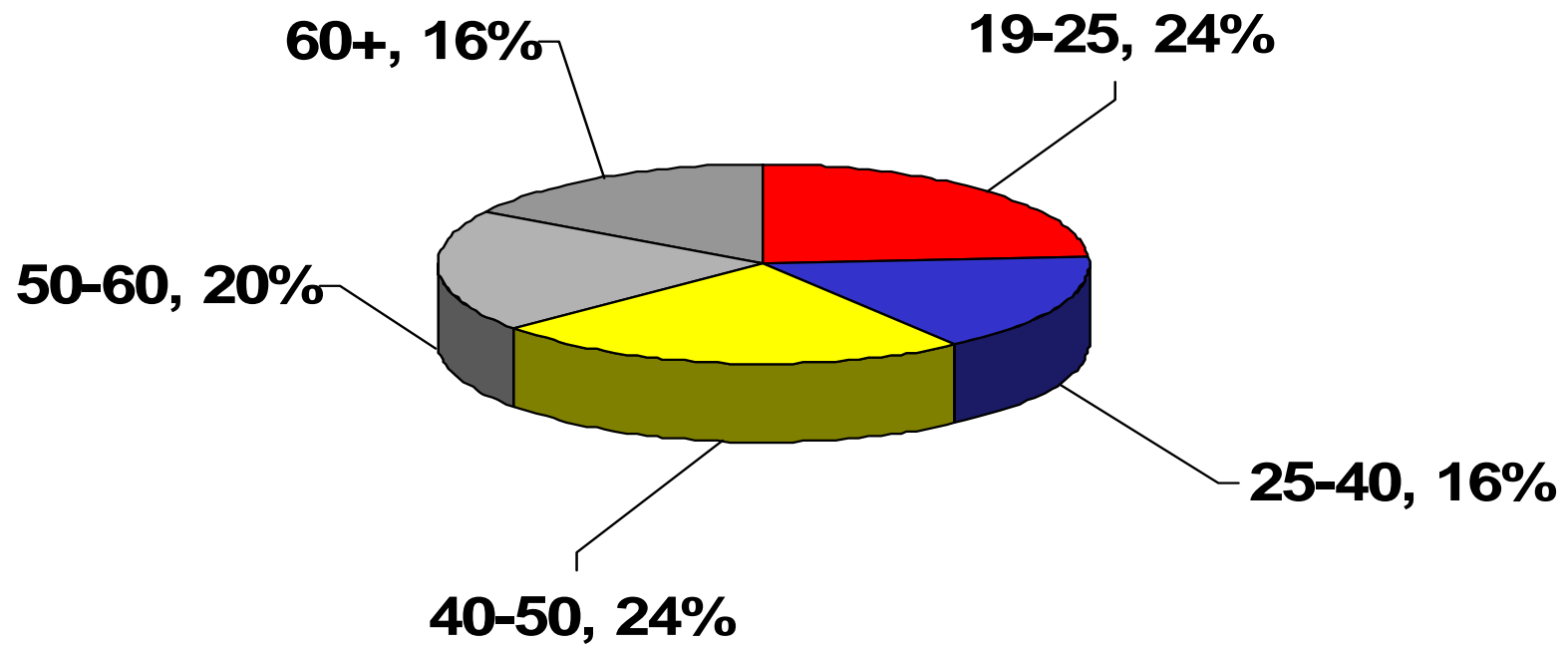
MNM Fatalities by Classification



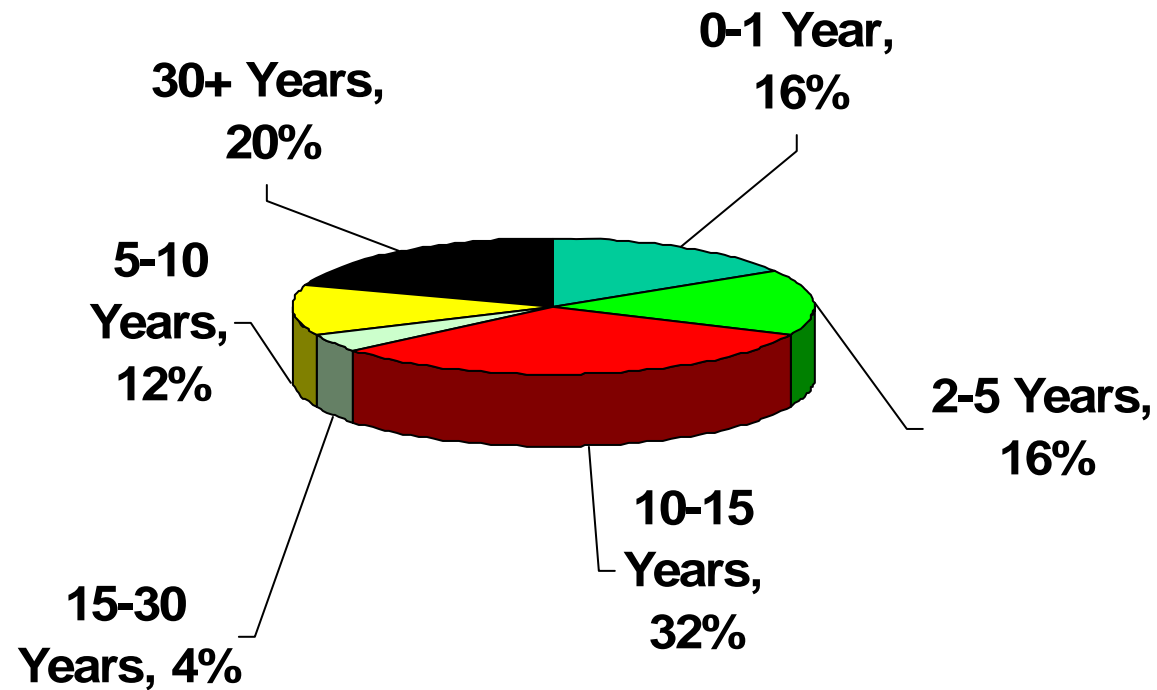
MNM Fatalities by Mine Size



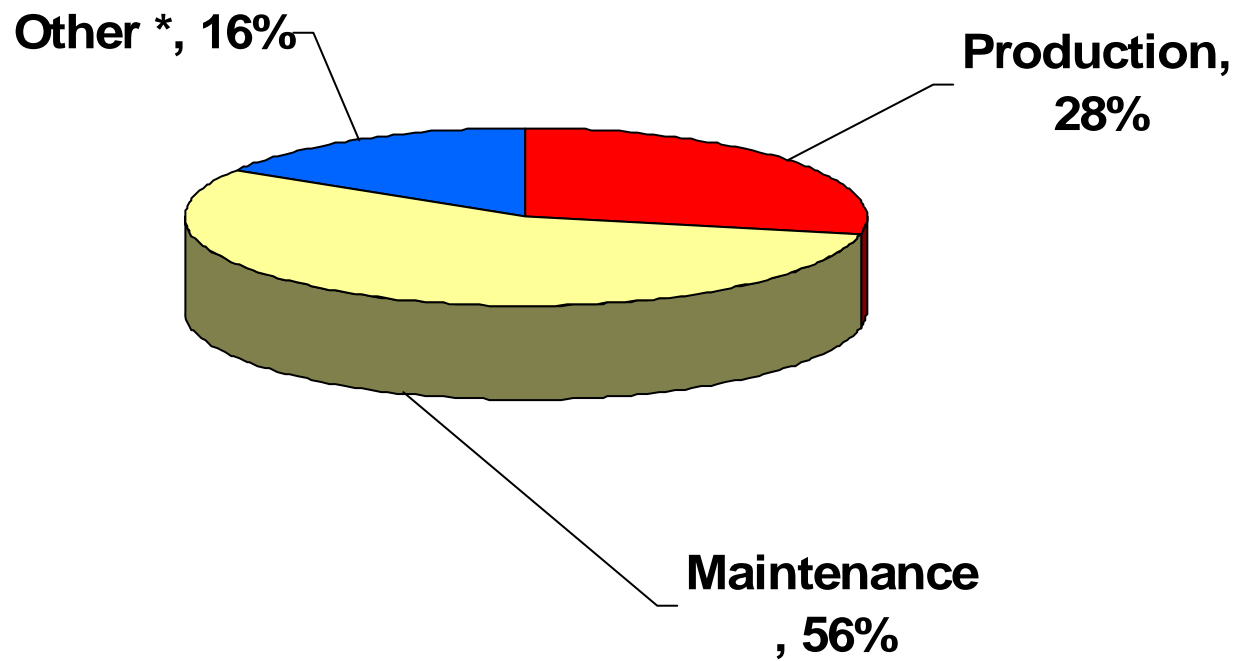
MNM Fatalities by Age



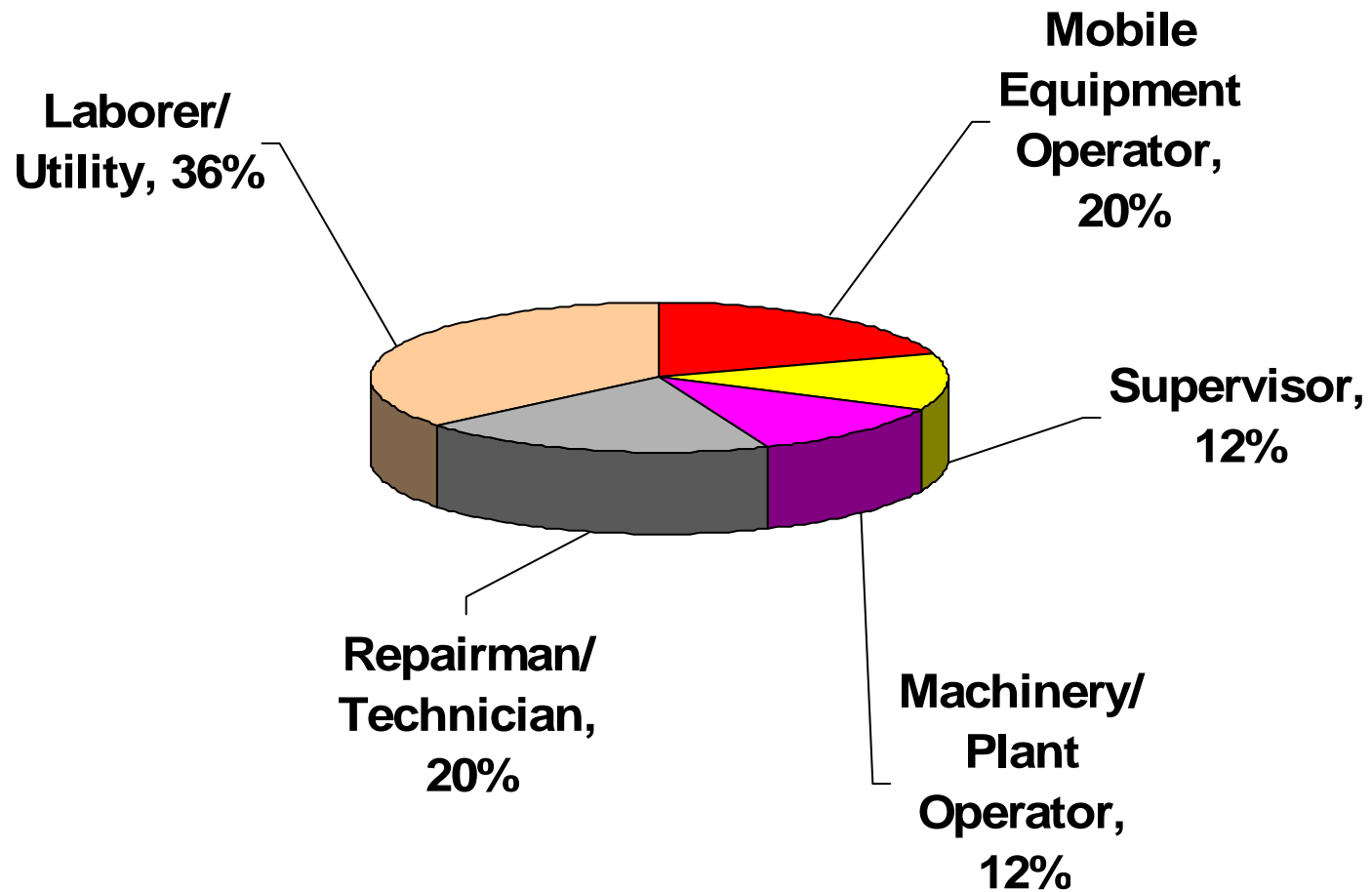
MNM Fatalities by Mining Experience



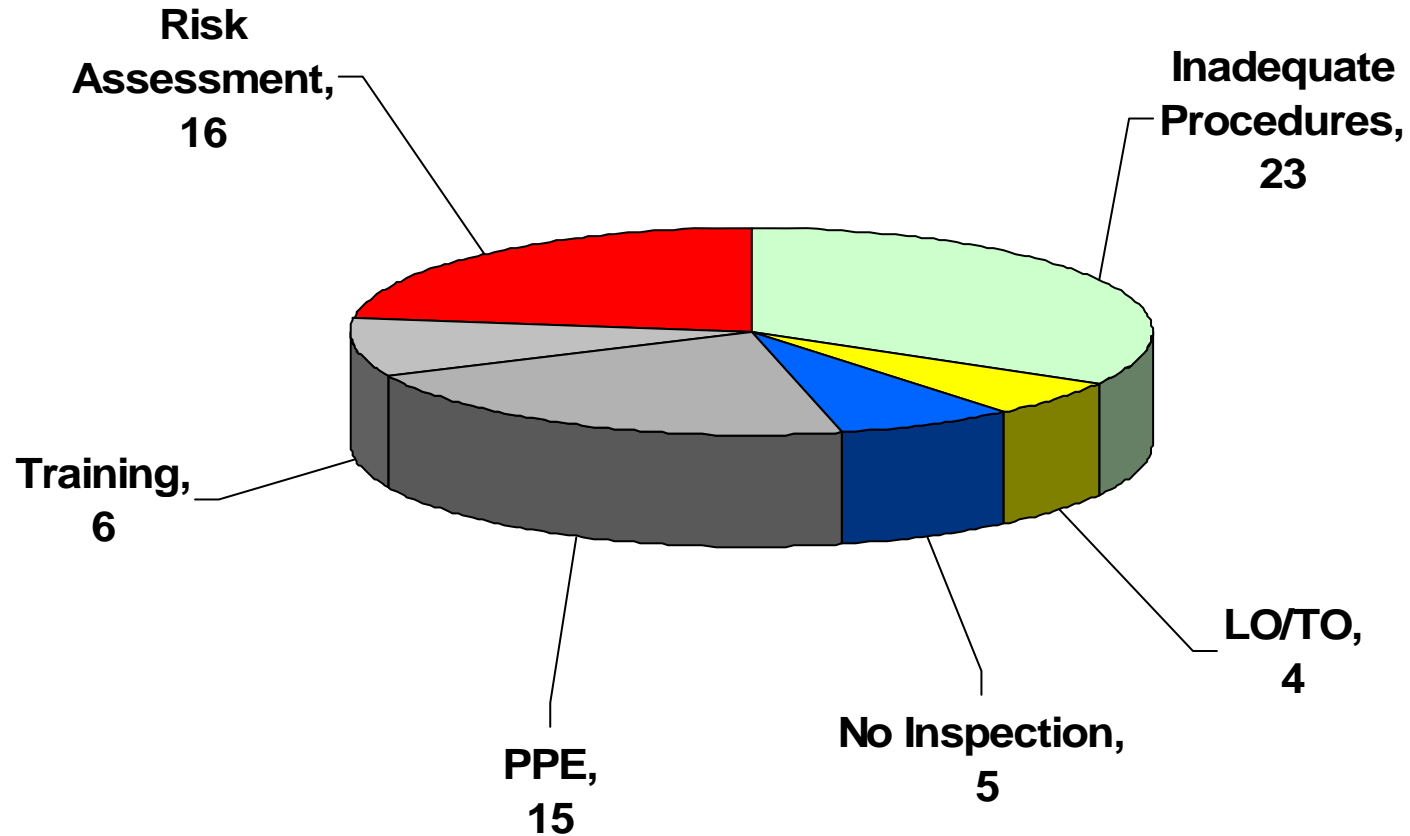
MNM Fatalities by Activity



MNM Fatalities by Occupation



Root Causes

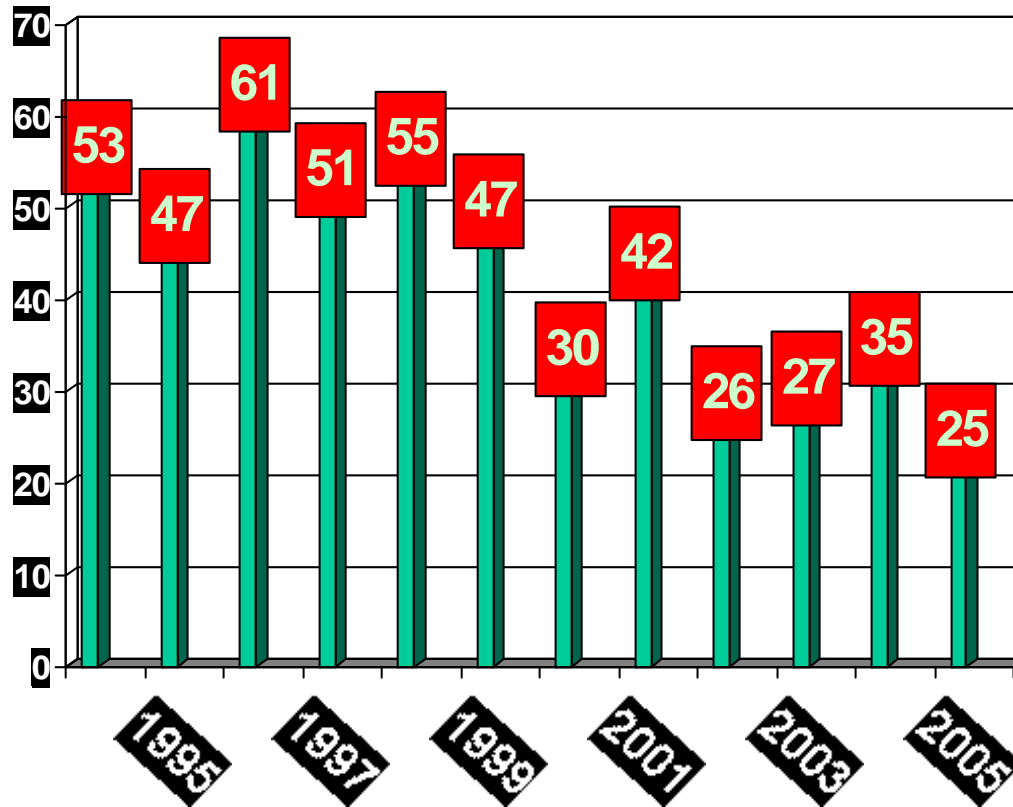


Note: Fatalities may have several root causes.

Root Causes

- No Risk Assessment Conducted
- No/Inadequate Policy or Procedures
- Did not use Personal Protective Equipment
- Lack of Pre-operation Checks
- Equipment not Maintained
- Training Inadequate
- Failure to Conduct Examinations

MNM Fatalities – 1995-2006





The majority of fatal accidents have these common root causes

- Failure to identify hazards
- Failure to manage risks

SLAM Risks the SMART Way!

Miners:

- Stop** Think through the task
- Look** Identify the hazards for each job step
- Analyze** Determine if you have the proper knowledge, training, and tools
- Manage** Remove or control hazards and use proper equipment

Mine Operators:

- Stop** Isolate each step in a task and identify past and potential accidents, injuries, and violations.
- Measure** Evaluate the risks associated with the task and barriers that have allowed hazards to cause injuries
- Act** Implement controls to minimize or eliminate any hazards that make the risk unacceptable
- Review** Conduct frequent work site visits to observe work practices and audit accidents, injuries, and violations to identify root causes
- Train** Develop a human factor-based action plan and then involve and train the miners

Make the RIGHT Decision!

New procedures in New Mexico

- **Landmark mine safety legislation was signed by Governor Richardson in March 2006**
 - House Bill 687 and Senate Bill 628
- **Mine Inspector has established the Mine Accident Emergency Operations Center**
 - (866) 761-6039
 - New Mexico Tech
- **Requires mines to prepare and file emergency notification plans and that establish a process for notifying the State when mine accidents occur**

New procedures in New Mexico

- **Mine operators to report accidents to the State within 30 minutes of the event**
- **Underground mines to provide communications equipment and additional breathing apparatus to underground miners**

Safety Belts

“Always operate within design or environmental limits”

“Always operate in a safe and controlled condition”

“Always ensure safety devices are in place and functioning”

“Always follow safe work practices and procedures”

Tenets of Operation Slogans

“DO IT SAFELY OR NOT AT ALL”

“THERE IS ALWAYS TIME TO DO IT RIGHT”

Information found in Material Safety Data Sheets (MSDS)

An MSDS provides detailed information about a specific product, such as:

1. Identity
2. Hazardous Ingredients List
3. Physical Data and Hazards (i.e., appearance, odor, etc.)
4. Emergency/First Aid Procedures
5. Health Hazards (i.e., symptoms of overexposure)
6. Reactivity Data (i.e., conditions to avoid)

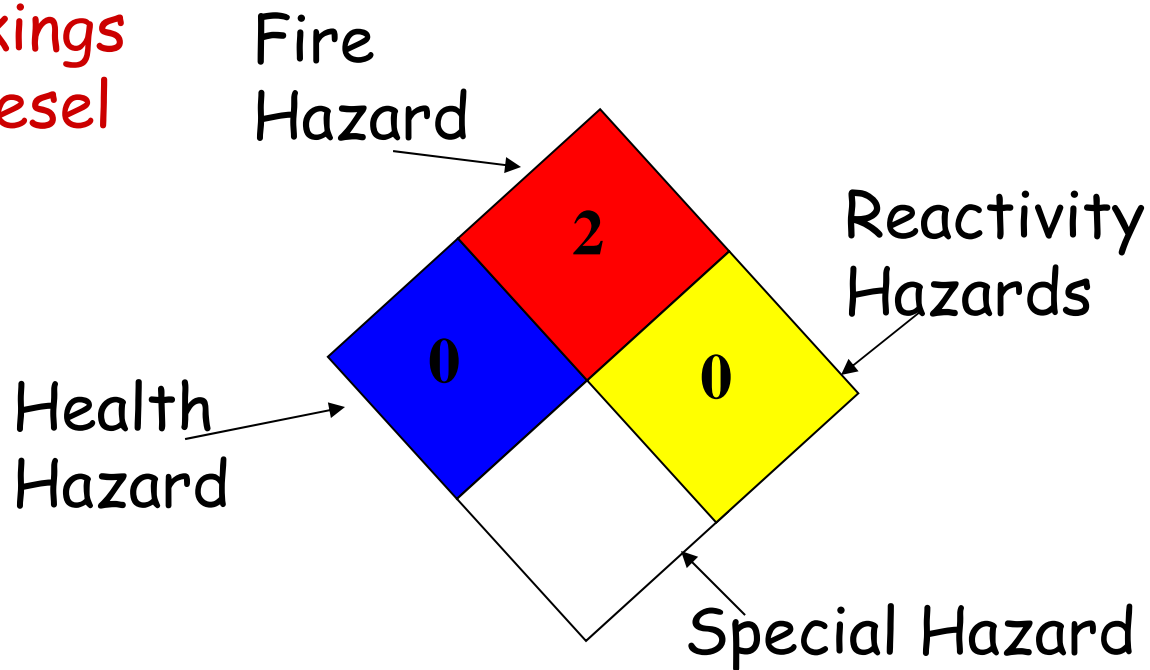
Information found in Material Safety Data Sheets (MSDS)

- 7. Fire & Explosive Information
- 8. Spill or Leak Response Procedures
- 9. Storage & Special Precautions (i.e.,
how to store, Personal Protective
measures to use during handling)
- 10. Transportation Data - DOT
regulations / Hazard class
- 11. Regulatory Information (i.e., EPA
classifications, etc.)

NFPA Labels

(National Fire Protection Association)

Hazard
Rankings
Ex. Diesel
Fuel



0 = Minimum 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Traffic Patterns



SAFETY
IS YOUR RESPONSIBILITY

IN THIS FACILITY, YOU ARE RESPONSIBLE FOR:

- WEARING A **HARD HAT** OUTSIDE YOUR VEHICLE
- OBSERVING THE **10 M.P.H.** LIMIT
- GIVING THE LOADERS AND PERSONNEL THE **RIGHT-OF-WAY**
- KEEPING PREMISES **CLEAN** AND **NEAT**

ONE-WAY TRAFFIC
OBSERVE ONE WAY TRAFFIC SIGNS



**What are the KEYS to good
communication?**

FOCUS!

ATTENTION!

UNDERSTANDING!

Ground control, highwalls, pits, stock piles and spoil banks

- **Inspect your work area and be alert to any changes in the highwall or stock pile.**
- **Weather, local geology, size of material and rate of mining effect highwall and stock pile stability.**



Water Hazards

- Working around water presents an additional hazard, drowning.
- Life jackets, fall protection and other precautions must be taken when working near water hazards.

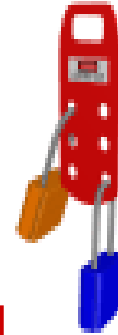


Water Hazards

30 CFR Part 56.15020

Life jackets or belts shall be worn where there is a danger from falling into water

Electrical Hazards



- What electrical equipment do you have at your work place?
- Only qualified persons should perform electrical work.
- Lock-out/tag-out policy
- You must be aware of all sources of hazardous energy and know how to control them.

Personal Protective Equipment

Designed for human protection

**Approved for specific
applications**

**When something goes wrong, can
be the difference between first
aid and a medical emergency**

Personal Protective Equipment

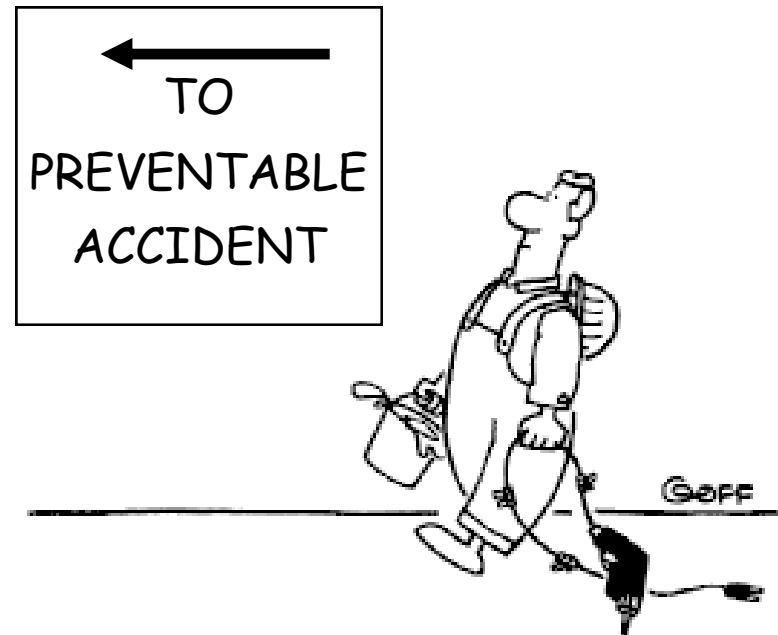
- Snug Fitting Clothing
- Hard Hat
- Safety Shoes
- Safety Glasses
- Hearing Protection
- Respirators
- Personal Fall Arrest Systems (PFAS)
- Welding PPE
- Any Others?

Personal Protective Equipment

- Any Others?
- Gloves? What will gloves protect?

Prevention of accidents

- **Hand Tool Safety**
- **Fall Protection**
- **Confined Space**
- **Material Handling**
- **Equipment Guarding**
- **Working Around Machinery**



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MOST MINES HAVE A SITE HEALTH AND SAFETY PLAN (HASP)

To provide a safe and healthful work place

Plan on what to do in case something goes wrong!

Site specific